THE RESEARCH ON XLPE CABLE INSULATION BASED ON GROUND CURRENT METHOD ON-LINE MONITORING TECHNIQUE

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ABSTRACT

The paper will start from the implementation of XLPE cable isolated on-line monitoring and then review the current development of the XLPE cable insulation on-line monitoring. The paper will make a brief introduction on the insulation on-line diagnosis method for XLPE cable (DC method, tgδ method, low frequency and compound judgment, partial discharge and ground current method). Through the analysis on the applicability of using the Changes in ground current method of cable to monitor the dielectric properties of power cable, the paper will provide the frame of insulation on-line monitoring of XLPE cable by ground line current method and the introduction of the use of sensors, signal processing, signal transmission, on-line power supply and the other key technology.

KEYWORDS

Distributed; Online Cable isolated Ground current

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INTRODUCTION

XLPE power cable insulation on-line diagnostic method can be divided into the six categories: direct current method, tgδ method, low-frequency method and composite method, partial discharge, ground current method. Below is the brief introduction of the each method.

1. DC METHOD

1.1 Direct current method,

When the water tree existed in the cable, similar to the needle electrode plate ---- rectifier effect, under the operating voltage, there will be low DC component currents flow past through the return circuit formed by the power cord, cable conductive core, XLPE insulated cable. We can measure the current if we put the nano-amp micro-level current measuring device into the grounding cable. Micro-current measuring device should be connected to a low pass filter and grounding protection to attenuate the AC component and detect DC component, in this way to ensure the safety of test personnel and the equipment. DC component is usually considered well-insulated when the current is less than 1nA, while poor-insulated if more than 100nA; if between 1 nA and 100 nA, the monitoring needs to be strengthened and Anti-Stokes light is temperature-sensitive, and its intensity changes with temperature.

1.2) DC superposition

This method is through the reactor to the DC voltage line superimposed on the cable insulation, the DC power supply by three-phase reactor connected to the wire by the high voltage shunt capacitor to remove the influence of the DC power supply by measuring the DC current flowing through the insulation for diagnosis. To prevent the DC voltage of GPT (micro-voltage transformer) open triangle secondary coil output voltage, the applied DC voltage is not high, about 10 ~ 5 0 V. The cable insulation under the influence of high pressure in the communication, although the increase DC voltage is not high, still reflects the actual state of insulation. Studies show that the water tree length increases, the DC superposition current rapid increase in communication breakdown field strength of its rapidly declining. Information requirements, with DC superposition method measured when the cable insulation resistance is greater than 1000MΩ good insulation when the insulation is less than 10MΩ bad, which correspond to current of 10nA, 1000nA about the micro-current measuring device can be measured.

2. Tgδ METHOD

Though taking out the voltage on the cable (via voltage transformer) and the power frequency current (via current transformer) flowed through the insulation and the digital measuring device, it can measure the tgδ of the cable insulation. According to the data, when the tgδ value is greater than 1%, the insulation can be judged as bad insulation. The voltage and the influence of the current transformer phase error on the measurement results need to be considered. If the application of sensitiviisty is 0.01%, it can be a good measuring device to monitor insulation. Then, the resulting information reflects the average degree of insulation defects.

3. LOW-FREQUENCY METHOD

3.1 low frequency component method

Because the presence of water trees, in addition to the DC component, also contains low-frequency