VARIOUS CABLE TERMINAL DEFECT TYPES AND ENVIRONMENTAL FACTORS IMPACT ON THE RESULTS OF PD TEST

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ABSTRACT

This paper simulate various external factors impact to the partial discharge of the cable terminal，and analyzed the reasons for the formationand and its obvious features by equivalent circuit combing with the discharge process curve，To facilitate the practical test in the future，and help to give the correct judgments and detect the developmental defects early, to ensure the safe operation of the cable terminal.

KEYWORDS

partial discharge patterns; analyze; distinguish

INTRODUCTION

With the development of power industry, partial discharge test is also more widely in the use of high-pressure test, but the the complexity of the surrounding environment often bring many obstacles to judge the normal partial discharge and interference, therefore, the results often lead to miscarriage of justice. So, in order to reference during the test we gather the typical discharge and interference patterns whose flat rate appeared higher in daily tests, after a summary and theoretical analysis, analyzes its causes and characteristics one by one.

THE GENERATION OF PARTIAL DISCHARGE

The definition of partial discharge

The electric field strength of eadh parts in electrical equipment insulation systems is often not equal, discharge occurs when the electric field strength reach to the breakdown strength of the local area in the region. But it does not run through the two conductors, that the insulation system is still remain its insulating properties, this phenomenon is called partial discharge. We call them which occurs in the insulation internal partial discharge, which occurs on the surface of the insulation surface partial discharge, and which occurs at the edge of the conductor surrounded by gas corona discharge.

The causes of partial discharge

PD is caused by the non-uniform electric field, and non-uniform electric field caused by many factor as follows:

Insulation contains air bubbles or other impurities: The relative dielectric constant of the gas close to 1, and the relative dielectric constant of solid, liquid is more than 1 times larger than those of gas, but breakdown field strength of solid and liquid is usually several times larger than gas, so the bubbles in the insulation is just the most common cause of PD. the bubbles in the insulation maybe format in the process of manufacturing, or maybe cracks due to thermal expansion and contraction at the interface between different materials, or because of the insulation aging and decomposition of gas.

Inhomogeneous media, such as various composite media: Gas - solid portfolio or combination of different solid. In an alternating electric field, medium electric field strength is proportional to the dielectric constant. So a medium whose dielectric constant is larger has the smaller electric field strength.

Asymmetric system of electrical equipment: Such as the tip electrode, electrode plate and cylinder electrode. Electric field is concentrated in the core part of the motor, in the high-voltage outlet terminal of the tansformer, the end of the cable and so on.

In addition, if there was floating potential exist in high field strength, the induce field will high at the edge of the field. In each connection of electrical equipment, if the contact is not good, there will produce high field strength in the very small distance between the two contacts, and cause partial discharge finally. Partial discharge will gradually corroded or damaged insulation, expanding the discharge area, eventually led to the insulation breakdown. Therefore, it is necessary to limit the partial discharge below a certain level. Cable terminal partial discharge measurements as an important indicator of product quality.

THE PRIMARY MEANS OF ANALYSIS THE TYPICAL DISCHARGE

The equivalent circuit of PD

PD is a complex physical process, there is electricity, sound, light, heat and other effects, and also will produce a variety of resultant. Analyzed from the electrical properties, when discharge occurs, the charge exchange and electromagnetic radiation, energy loss occurs at the same time. The most striking is a weak pulse voltage appears in the two ends of the test product. The pulse signal can be illustrated by a simple model and the equivalent circuit, as shown in Figure 1and Figure 2. Figure 1 is a simulation of a insulatorcontaining a small bubble, C indicated in the figure is the small bubble in insulation, B represents the part of the media in series with the bubble, a is the rest of the media. Analysis from the viewpoint of circuit, can be expressed by equivalent circuit as shown in Figure 2.