EARLY DETECTION OF DEFECTS DEVELOPING IN OIL-FILLED EQUIPMENT BASED ON THE RESULTS OF DISSOLVED GAS ANALYSIS

Shutenko O.
National Technical University
"Kharkiv Polytechnic Institute", Kharkiv

Currently, the main signs of defects in high-voltage oil-filled equipment are the increase in gas concentration values and/or rates of gas generation. Exceeding at least one of the established limit values allows to assume the presence of a defect in the equipment. However, the results of studies presented in [1-2] indicate that the concentration of gases may increase to levels that exceed the limit values when exposed to short-circuit currents, switching and atmospheric overvoltages, as well as other factors. This circumstance can lead to erroneous equipment rejection, that is, to a I type error. To recognize the reasons for the gas content increase, [1, 3] propose using the characteristic dependencies of gas concentrations on the duration of operation. In particular, it has been established that the development of defects in oil-filled equipment is characterized not only by an increase in the concentrations of characteristic gases but also by the appearance of a systematic component in the dependencies of gas concentrations on the duration of operation. When the concentration of gases caused by external factors increases, the systematic component is absent, but there is usually a significant correlation between the gas concentrations in neighbouring equipment. However, when defects develop, there is no significant correlation between the gas concentrations in neighbouring equipment.

A crucial point is that the appearance of a systematic component in the dependence of gas concentrations dissolved in oil occurs at an early stage of defect development, when gas concentrations do not exceed the limit values. This makes it possible to detect defects at an early stage of their development, before the main insulation is damaged.

References:

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