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VOLTAGE MEASURING TRANSFORMER AND ITS INSULATORS RELIABILITY EVALUATION

Reliability evaluation of insulating structures of measuring transformers is one of the most important components during commissioning in various substations.

The design of measuring transformers has a supporting insulating structure (tire) that places conductive and grounded parts inside.

For example, in multi-stage transformers, such as HKT– 362, which consist of two stages, the lower insulator is pressed by the weight of the upper insulator with magnetic conductors and coils inside, so the requirements for the lower reference insulator are greater.

In this case, with increasing stages of the transformer, along the insulating tires a sharp uneven distribution of voltage and field strength from the electrode with a high potential to ground is observed.

The authors [1, 2] published a series of articles defining methods for evaluating the distribution of electrical load on the supporting insulating tire on the basis of capacitive substitution schemes, on the example of a current transformer of ТОГ – 362series.

Based on the considered methods, it is possible to evaluate the specified distribution of voltage and field strength along the insulating tire, taking into account all the design features of the device.

The structure of the polymer tire insulation of gas-filled measuring transformers is very complex, and the uneven distribution of field strength significantly affects the service life of the insulation.

Under such conditions, the criteria for assessing reliability may be such characteristics as the probability of failure, the intensity of failures and the density of failure.

All of the above reliability characteristics are related by simple mathematical relations, which are defined for the chosen theoretical law of distribution of a random variable, such as operating time to failure or overlap voltage.

Therefore, it is almost impossible to determine it precisely, but it is possible to make a rough estimate.

The method developed by the authors [1, 2] allows to determine the operational reliability of measuring transformers by determining the parameters of theoretical distributions, which are based on data from experimental studies and statistical information and monitoring data of insulation structures that can be obtained during actual operation.

Accurate data using this method of predicting the parameters of the theoretical laws of distribution can be obtained by conducting additional series of calculations and experimental tests of specific insulating structures, and the more tests will be conducted, the greater the accuracy of the initial results will be achieved.

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