

ASSESSMENT OF PROBABILITIES OF WRONG DECISIONS AT DIAGNOSTICS OF THE CONDITION OF TRANSFORMERS ON VALUES OF SPEEDS OF INCREASE OF GASES

L.S. DIDYK^{1*}, O.V.SHUTENKO²

¹*master department of electric power transmission, National Technical University «Kharkov polytechnical institute», Kharkov, UKRAINE*

²*candidate of technical sciences, associate professor, National Technical University «Kharkov polytechnical institute», Kharkov, UKRAINE*

**email: lilu217icloud@mail.ru*

The criterion of speed of increase of the gases dissolved in oil, is one of the main criteria by means of which the decision on existence of defect in the transformer is made. As a rule, this criterion is used in the majority known techniques on interpretation of results of the chromatographic analysis of the gases (HARG) dissolved in oil.

The made analysis showed that various techniques use not only different boundary values of speeds of increase of gases, but also distinctions in approaches to calculation of values of speeds of increase. Considering, possible economic consequences, in case of adoption of wrong decisions, it is quite obvious that it is necessary to use those boundary values of speeds of increase of gases which provide the maximum reliability of the made diagnoses.

However, now there is no the standardized or standard criterion allowing to execute quantitative comparison of reliability of the made decisions when using various techniques on interpretation of results of HARG. One of such criteria which allows not only to carry out comparison of reliability of decision-making when using boundary values of speeds of increase of the gases recommended by different techniques but also to define boundary values – there is a criterion of the minimum risk

In the report the technique of determination of values of probabilities of wrong decisions when using boundary values of speeds of increase of gases is stated, as criterion of existence of the developing defects in high-voltage power transformers.

At an assessment of values of probabilities of wrong decisions when determining type of defect on speeds of increase of gases it is necessary to consider three major factors:

1. Diagnostics of a condition of object is carried out in a complex of diagnostic parameters, therefore, it is necessary to carry out transition from one-dimensional to multidimensional distributions;

2. It agrees to the normative document in Ukraine of SOU-N EE 46.501:2006 [1], the decision on existence of defect can be made as on values of speeds of

increase of gases and on values of concentration of gases. The decision on existence of defect is made, if:

- level of concentration of one of gases or the sum of gases of a hydrocarbonic row exceeds level 2 border;

- concentration of acetylene exceeds an analytical threshold of recognition regardless of value of concentration of other gases or the sum of gases of a hydrocarbonic row,

- values of speed of increase of the sum of gases of a hydrocarbonic row are exceeded by 30 ml per day regardless of value of concentration of separate gases or the sum of gases of a hydrocarbonic row.

3. For the purpose of decrease in an error, value of speeds of increase of gases it is recommended to define if concentration of gases exceed some analytical threshold of recognition.

Considering, the above, values of probabilities of wrong decisions at diagnostics of a condition of transformers will be determined by values of speeds of increase of gases as:

The probability of an error of the I-st sort, will represent probability of that in the absence of defect, concentration at least of one of gases will have the values exceeding level 2 border, or value of speed of increase at least for one of gases will exceed the boundary.

Depending on values of concentration of gases, value of probability of an error of the I-st sort, will be defined as the sum of combinations of probabilities of excess by concentration of gases and their speeds of increase of the corresponding boundary values, at first for one of gases, then for two, etc.

The probability of an error of the II-nd sort, will represent probability of that with defect, concentration of all gases will have the values which aren't exceeding level 2, and values of speeds of increase for all gases, will also be in area of a faultless state.

Thus, values of probabilities of wrong decisions at diagnostics of a condition of transformers will be determined by values of speeds of increase of gases not only parameters of laws of distributions for defective and faultless states and boundary values of speeds of increase of gases, but also parameters of laws of distributions for defective and faultless states and boundary values of concentration of the gases dissolved in oil that considerably complicates expression for calculation of average risk.

List of references:

1. ITS SOU-N EE 46.501:2006 Diagnostics of the oil-filled transformer equipment by results of the chromatographic analysis of the free gases which are selected from the gas relay, and the gases dissolved in isolation oil.