VIBRATION ACCELERATION AT HIGH FREQUENCY AT 1 kHz

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ABSTRACT

The dynamic viscosity values of the oil were determined by monitoring the vibration acceleration at a value higher than 1 kHz. The degree of dependence of vibration acceleration on dynamic viscosity was determined.

Keywords: transformer narrow, oil, dynamic viscosity, vibration acceleration, oil temperature, mechanical mixtures.

INTRODUCTION

The world economy is developing rapidly. A significant increase in the demand for electricity requires reliable operation of the power supply system. Transformers are one of the important elements of the system of supplying electricity to consumers. Long trouble-free operation of the transformer is important both from the safety and economic point of view. The service life of oil power transformers is defined in regulatory documents as 25 years [1]. The conducted scientific literature showed that the assessment of the efficiency of power transformers in long-term operation is a complex system.

It is necessary to analyze diagnostic parameters: temperature, pressure, currents, noise level, vibration frequency, vibration speed, vibration acceleration [2]. Early identification of faults and their causes using transformer diagnostic methods can reduce 75% of electrical equipment costs, 63% of losses from lack of electricity, and save 2% of annual costs [3]. Due to today's on-demand energy and resource saving, scientific research on ensuring long-term operation of technological devices is aimed at identifying defects that have started in the transformer, how to extend its service life and reduce repair costs. are being studied.

Coils are the main part of power transformers. Power transformers are affected by various factors that worsen their performance and cause them to fail during operation. There are two types of defects in oil transformers. The first is the short-term failure of the plant. This is caused by consumer load. The second is the formation of a defect over a long period of time, and this is the biggest cause of damage. This is caused by internal short circuits and localized overheating.

Early detection, monitoring and management of faults guarantee reliable operation of transformers. There are many ways to diagnose oil-fired power transformers in operation. One of the most acceptable methods of diagnosis is vibration control and thermal control methods.

METHODS

Diagnostic methods, vibration control, thermal image control, analytical analysis, correlation analysis methods were used in the research process.

RESEARCH RESULTS AND THEIR DISCUSSION

Oscillation at frequency above 1kHz was observed to control transformer defects. Because the vibration amplitudes of the transformer in operation with a frequency higher than 1 kHz are formed in small particles that are not attached to the active part. For this, the vibration acceleration on the upper part of the surface of the transformer tank was taken for research. An element independent of the active part of the oil power transformer is its oil. The reason for controlling the vibration of the upper part of the transformer is that the oil is actively moving in its upper part.

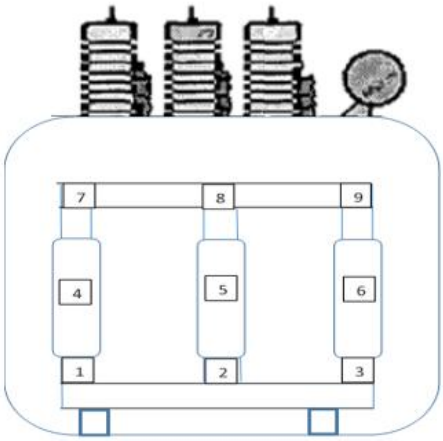
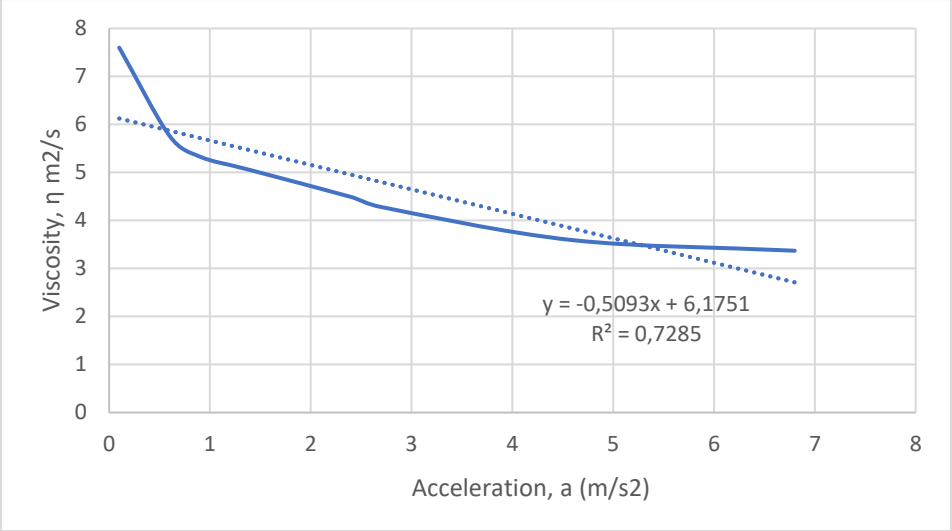


Figure 1. Transformer see on the wall vibration acceleration control for sensors recommendation done installation places

Research result from 1 k Hz to 10 k Hz was _ in frequency take went observations that's it shows that measure points up swing upwards _ acceleration level rising up is going Results transformer Baku on the surface received because of asset of parts vibration to the value of dependent _ that it is not shows . Transformer asset parts to the base location because of them Fault if observed vibration level values bottom at points bigger will be _ from 1 kHz high frequency vibrations of the transformer asset parts with not connected small elements by harvest will be _ [3].



2 – picture. Oil power transformer characteristic of the dependence of dynamic viscosity on vibration acceleration.

It is possible to indirectly estimate the dynamic viscosity of the oil power transformer in the operational state. The increase in mechanical impurities in the transformer oil lowers the dynamic viscosity. At the same time, we can see that in the process of controlling the vibration acceleration at a frequency higher than 1 kHz, mechanical compounds affect the vibration parameter.

We can see that the vibration acceleration of the oil power transformer depends on the dynamic viscosity of the oil through the following function

$y = -0.5093x + 6.1751$

It turns out that the degree of dependence of vibration parameters on dynamic viscosity is $R^2 = 0.7285$.

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