INCREASING THE EFFICIENCY OF POWER OIL TRANSFORMERS FOR CLEANING FROM OIL COMPOUNDS DEVELOPING A REGRESSION MODEL FOR DETERMINATION OF OPTIMAL TEMPERATURE EXIT

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Abstract: Transformer oil is one of the most effective methods of drying, and its very wide application is associated with the elimination of significant technological difficulties in their production, because the filter elements can work efficiently only with high-quality processing. The functional properties of transformer oils are the properties that affect its function as an insulating and coolant. Even small amounts of gas bubbles and mechanical compounds can reduce the dielectric strength of the oil, and some of these compounds can cause high dielectric losses. Removal of contaminants from the oil leads to the return of the electrical parameters of the oil to the desired level.

Keywords: Transformer oil, mechanical compounds, oil level, power loads, ambient temperature, oil temperature at the hottest point.

Introduction

Restoration of electrical stability during transformer oil cleaning In order to do this, it is necessary to clean it from mechanical and chemical impurities. Mechanical compounds and oils that reduce the electrical strength of the oil Oil purifiers are used to remove moisture. The process of mechanical and moisture removal of transformer oil is the same is a complex process. Perform this process using the following device can be increased. The device is one We will mention a few shortcomings. The efficiency of the device depends on the contamination of the oil The number of processing cycles can be from 5 to 7. Due to this, the oil is cleaned and the development of a new method for drying a seasonally operated transformer in a short time allows you to run.

The block diagram of the voltage converter with frequency f = 50 Hz to alternating voltage with frequency f = 400 Hz is developed. Control circuits of the electric drive of the centrifugal separator are chosen. The analysis of operation of electric drive control circuits is carried out and the principles of their work concerning two components are considered: the regulated rectifier and the inverter.

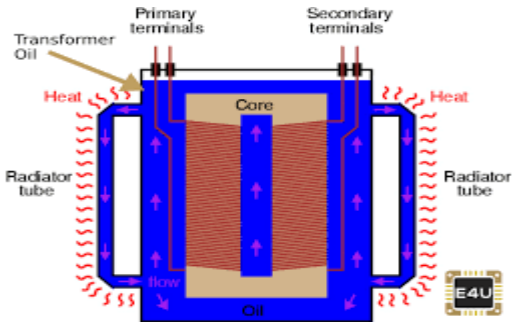


Figure 1. Technological process of cleaning oil from mechanical impurities and moisture scheme: 1 - soaked oil tank; 2 - the pump; 3 - oil heater; 4 - separator; 5 - ceramic filter; 6 - selekagel.

Transformer oil for regeneration in the device using a pump 2 from tank 1 the oil is fed to the heating device 3. From the large solid particles in the heated oil4 separator cleaned and fine-grained in 5 ceramic filters. Transformer oil moisture extraction is carried out in a 6-cell cartridge. From it return to the oil tank 1 falls. The cleaning cycles are repeated until the oil reaches the required values.

Originality. The scheme of the converter of alternating three-phase current with voltage of 220 V and frequency of 50 Hz, into alternating three-phase current with voltage of 220 V and frequency of 400 Hz is developed. This frequency, in addition to providing the necessary characteristics of the oil separator, allows you to develop a converter device of a relatively small weight and volume, and also provides its high reliability. Practical value. Utilizing the used transformer oil in this way will solve several problems at once. It is possible to reduce the initial production of transformer oil. The issue of waste oil disposal is being resolved leading to the solution of the environmental aspect of this problem. All this will reduce the cost of oil poured into transformers and the operating cost of transformer substations.

The circuit is used in electric drives that op- erate with frequent transients, and in cases where AM braking with heat recovery to the network is needed.

It should be noted that there are some fea- tures of the elements calculation:

1 estimated transformer power Sт=Pт=Pr-out,

W. Pr-out – rated output power of TRU;

2 the voltage on the primary winding of U1ph transformer is assumed to be by 9…12 % less than the rated voltage of the supply network. This is due to the need to have a reserve to maintain the voltage Ud constant and to reduce the level of primary voltage;

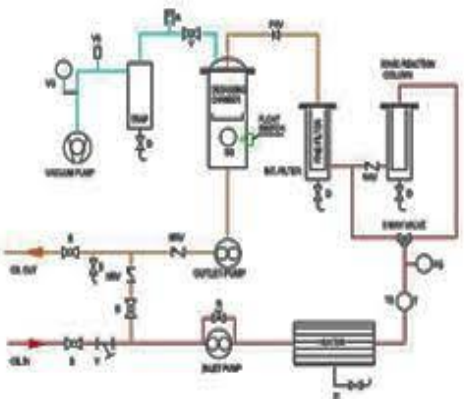
3 the current value of current in thyristors is calculated according to the formula:

$$I_a = \frac{0.817 I_{r-out} * W_2}{W_1};$$

1 the average value of the current in a valve is determined as:

$$I_a = \frac{0.33 I_{r-out} * W_2}{W_1};$$

Research shows that 80% of oil related failures and breakdowns are caused by contaminated oil. Preventive oil maintenance is therefore an important factor to ensure optimum equipment reliability.



Oil Result Before and After Treatment

Parameter	Non-treated Oil	After Treatment
Moisture (Water Content)	≥120 ppm	≤ 5 PPM
Gas Content	10%	≤0.01% (Vol)
Impurities Degree (Filtration precision)	2%	≤ 5 micron (no free carbon)
Breakdown Voltage (Dielectric)	25 kV	≥70 KV
Flash Point	70	≥ 145℃
Cleanliness	NAS 1638 Grade 10	≤NAS 1638 Grade 6

Consequently, the oil darkens in colour and the acid in it begins to increase. Oil impurities are one of the major causes of transformers deterioration.

To avoid transformer failure, your insulating oil should be free from any contamination, dirt and moisture. Thus, transformer oil filtration process is needed.

Depending on the type of oil water can be removed to < 50 – 100 ppm. The dictionary definition of coalescence is "To grow together; to unite into one body or mass." As applied to the technology of oil water separation, coalescence is usually accomplished by a first stage of fibrous media that allows oil to pass through but attracts and "stores" the emulsified water until these tiny particles unite, or coalesce, to become large droplets of water. This free water is then released to a second stage utilizing a water repellant media. It will be provided with water drain tank, for removal of separated water periodically. Pressure gauge will be provided to indicate the clogging of filter.

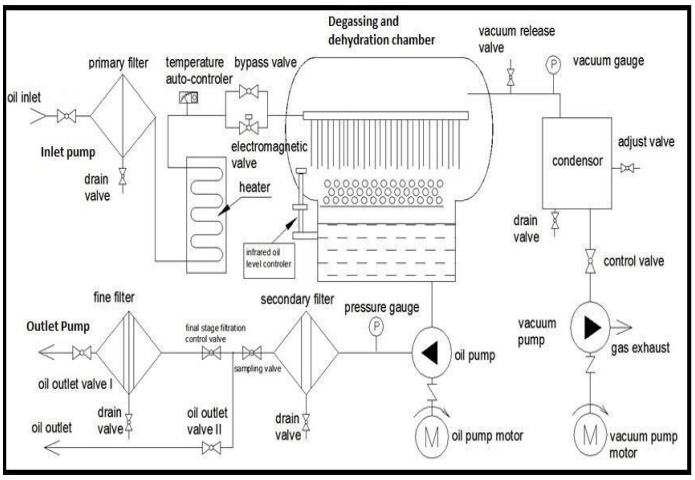


Fig -2: Circuit Diagram of High Vacuum Transformer Oil Filtration Machine

After three to five passes in the high vacuum transformer oil filtration machine, the transformer oil gets purified. Fig. 3 shows the transformer oil before and after filtration from high vacuum transformer oil filtration machine. The brown colored oil is unfiltered oil whereas pale yellow colored oil is filtered (or purified) oil. Fig. 2 shows the circuit diagram of high vacuum transformer oil filtration machine.

The dielectric properties of oil may vary depending upon the content of gas, moisture, suspended particles and contaminants. Even new oil absorbs gas and moisture while in storage. Therefore sometimes oil is to be treated before use. Degassing and dehumidification of oil is also necessary periodically, during use, because dielectric properties will be affected due to the absorption of gas and moisture in service at different weather conditions.

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