

## DRYING OF INSULATION OF WINDINGS OF ELECTRIC MACHINES

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**Relevance and formulation of the problem.** During operation, transportation and storage, the insulation of the windings of electric machines is moistened. Dielectric characteristics deteriorate when exposed to moisture deteriorate, so in order to extend the service life of electric motors, the urgent task is to remove moisture from the windings of electric machines (drying).

**The main materials of the research.** External heating is used if the active part of the machine has become wet. To do this, the insulation of the windings is dried with a coolant in the form of hot air (Fig. 1), using blowers with heaters, incandescent lamps and heating resistors. The amount of air required when using a blower per minute is equal to one and a half volume of the chamber in which the electric motor is dried. The power of the heating element must be equal to the volume of the chamber in cubic meters. If the volume of the chamber for drying the electric motor is 8 m<sup>3</sup>, then the volume of hot air required to pass through this chamber should be 12 m<sup>3</sup>, and the power of the electric heating element - 8 kW.

To remove moisture from the insulation layers of the windings with a short-circuit current (Fig. 2), the windings of the individual phases are short-circuited and a reduced voltage is applied to them. The source of voltage is usually welding transformers.

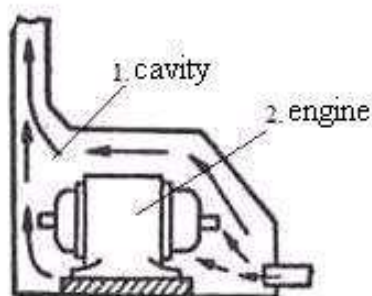


Figure 1 Blowing the insulation of the windings with current

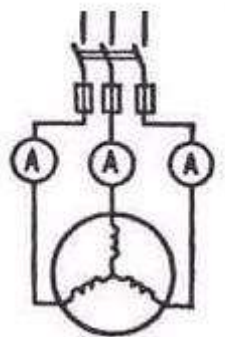


Figure 2 Drying of short-circuit insulation with hot air

The electric motor is covered on top with heat-insulating material. The current in the stator windings is adjusted to 50% of the nominal and maintain it at this level for 2-3 hours. The next three hours (at intervals of twenty to thirty minutes) the current is adjusted to 90% of nominal. In the first 3 - 5 hours the temperature of the windings should be 40 - 50 ° C, after 8 - 10 hours of drying the temperature of the windings should not exceed - 60 - 70 ° C. The outgoing air temperature should not exceed 50 ° C, and the insulation temperature of the winding should not exceed 70 ° C. Every two hours, check the temperature of the windings with a thermometer and determine the resistance of their insulation with a megohmmeter.

Drying of the electric motor can be considered complete if at a temperature of hot air of 50 - 60 ° C insulation resistance will remain constant within 3 - 5 hours.

Recently, the best methods of drying electric motors by induction losses in stator steel have been introduced in stationary machines that are not connected with the

passage of current in the windings. With this method of drying, there are two types of losses: losses in the active steel of the stator and losses in the stator housing.

Heating of electric motors is carried out by losses on reversal of magnetization and eddy currents in active steel of a stator of the electric motor of alternating current or inductor of the car of a direct current from the alternating magnetic flux created in cars in a stator core and the car case. Alternating magnetic flux is created by a special magnetized winding, which is wound on the body of the machine on its outer surface with the conduction of conductors under the frame or on the housing and bearing shields, alternating magnetic flux is also possibly created by induction losses in the stator active steel and electric machine housing.

The rotor of the asynchronous or synchronous machine must be removed to allow the windings to be wound on the stator to be magnetized. The magnetizing winding is made with an insulated wire, the cross section and the number of turns is determined by the appropriate calculation. In the process of drying, the insulation resistance of the windings of electric machines in the first period of drying decreases, then increases and, reaching a certain value, becomes constant. At the beginning of drying, the insulation resistance is measured every 30 minutes, and when a constant temperature is reached - every hour.

The results are entered in the drying log and at the same time the curves of the dependence of the insulation resistance and the temperature of the windings on the drying duration are crossed out. Measurements of insulation resistance, winding temperature and environment are continued until the electric machine is completely cooled. The removal of moisture from the windings of the electric machine is stopped after the insulation resistance is constant at a constant temperature for 3 - 5 hours.

**Conclusions.** The most common methods of drying motor windings, which will be able to provide the normative resistance of the insulation of the stator windings.

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