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EXPERIMENTAL STUDY EROSION-WEAR CONTACT DETAILS SERIAL ACTUATORS AS A FUNCTION OF SWITCHING NUMBER

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The results of studies of wear resistance and erosion serial contact details electromagnetic starters based on silver. The regularities of erosion frangible bridged contacts.

The electromagnetic starter, switching test bridge contacts, contact materials, electro wear, erosion resistance.

Starters, produced by the domestic industry with its technical parameters, mainly with current level, but given the trends and dynamics of the electromagnetic field of starters abroad may lag by a number of parameters from samples of foreign firms. New domestic-type actuators pml produced under license from "la telemecanique electrique" (france) [6, 8] and almost the same as the french actuators except for facilities maintenance and safe operation (no degree of protection IP20), with the weight and dimensions of 1, 5-2 times lower than in old starters series pme and pae. Therefore, tests are used for starters pml values 1 and 2, the contact details of which are made of a material based on silver (СрН-90, СрМ-0,2+М1, СОК-15).

The purpose of research - mathematical definition of the law of mass change of contact details as a function of operating time and transition resistance bridged contact.

Materials and methods research. Research for serial contact details starters ПМЛ-1100$О_х$4 (A, B and C) ПМЛ-2100$О_х$4 B held in the technique, which is described in [1, 5].

The total number of switching cycles switching on-off for all starters accepted the same and equal to 300 thousand. The necessary measurements are taken every 50 thousand. Switching cycles. The load current is selected (for starters values 1 and 2), based on the proposition that the nominal operating current starters: 4; 6.3; 10 a. The tests are carried out under the influence of special korozyvnoho environment that consists of a mixture of gases NH_3 + H_2S. Rated high value concentration of ammonia and hydrogen

sulfide is respectively 30 mg / m3 and 25 mg / m3 [2]. Call details are weighted with kontaktotrymachamy. Tests are carried out for two starters each value open construction without thermal relay.

Treatment of experimental data to determine the mathematical law of mass change of contact details is carried out as a function of operating time for the methodology presented in [3].

Results. The research is based on special tables depending electro serial wear contact details starters PML with different contact materials.

Reliability electrical contact primarily determined by its constituents, structure and properties of surface layers formed by the erosion and transport of the contact material in electric arc [4, 7]. When switching AC changing the polarity of the current flow through the junction and the experimental data set is negative (ie reducing weight) ratio of intensity of electrical erosion in the fixed contact details (1, 2, 3, 4, 5, 6) and moving (bridge 1 2, 3-4, 5-6). But moving contact details to intense wear 10-27%. This phenomenon is typical for contact AC can be explained by the fact that when testing the temperature of moving bridges was higher than the temperature fixed contacts 25-30 °C. Weight movable contact bridged type decreases slightly larger than the mass of the fixed contact, because processes in arc erosion accompanied by intense evaporation and spray material. Is caused by the fact that with increasing current in the contact process factors play a significant role plasma arc and arc erosion wear increases due to increase energy arc. And to arc erosion significantly influences the phase composition and structure of the contact material, as arc channel assigned to structural components with low thermal and electrical conductivity.

The greatest erosion resistant contacts with КМК-А10м (PML 2100.V starter). Resistance material КМК-А10м higher at 13-30%, than contact with material СрН-90 and 35-45% higher than in bimetallic contact СрМ-0.2 + М1. High contact electroresistance КМК-А10м in our study achieved the structure and characteristics of the material cadmium oxide CdO. There arc burns in an atmosphere of cadmium vapor and oxygen ionization potential which is higher than the vapor Ag.

Somewhat lower electro-resistance material in СрН-90used in actuators ПМЛ-1100O_x4 А. Material СрН-90 includes two components phases: silver - 90% and nickel - 10%. Phase nickel and silver do not mix either solid or liquid. Nickel in this pseudoalloys

improves wear resistance determines the strength and stiffness, prevent contact welding and reduces mostykoutvorennya contributes tryvkosti to atmospheric corrosion. When heated to 500 °C nickel gradually oxidized, but the oxide film - a thin and poorly maintained on the metal, resulting in minor mechanical forces destroyed and she does not break electrical contact. Therefore, contacts CpH-90retain metallic look a long time at work. This film does not increase contact resistance under the influence of contact arcs.

Least eroziynostiykymy have contact with material CPM-0.2 + M1. Their erosive wear in 1.4-1.6 times greater than in contact with the material КМК-А10м. These bimetallic contact details zaklepkovoho type bottom layer is made of copper M1 and is not eroded. Working plakuyuchyy layer is made of a material: 99,8% Ag + 0,1% Ni + 0,1% Cu. The minimum thickness of the working layer due to the technical capabilities of welding machines and holodnovysadkovyh site is ≈0,3 mm.

Thermal performance arc causes evaporation and spray material contact surfaces contact details oxidized. In the process, possible significant changes in the surface layer. On the surface oxides formed contacts silver, copper, nickel.

Conclusions

1. The contacts who work at the rated current to 10-25 A, suffer destruction and erosion from exposure to electric arc.

2. Established linear law erosive wear contacts on the size and strength of the current number of switching cycles revealed a negative factor intensity electrical erosion in stationary and moving contact details. Moving to wear contacts 10-2 7% more intense.

3. Erosion resistance contact with material КМК - А10м at 13-30% higher than in CpH-90 and 35-45% higher than the CpM-0.2 + M1. In the surface layers of the CpH-90 found a significant number of refractory component (Ni), which reflects not only the priority evaporation of silver, but also the presence of bridged transfer.

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The results of investigations deterioration of stability and erosion of the serial contact details the electromagnetic starters based on silver. The regularity of the erosion frangible bridge contacts.

The electromagnetic starter, switching tests, bridge contacts, contact material, electrical erosion wear, erosion resistance.