

RANKING FACTORS OPERATIONAL IMPACT ELECTROMAGNETIC ACTUATORS

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Classification operational factors influence the electromagnetic starter revealed the importance of factors influence the degree of reliability and starter switching device.

Rank correlation, starter solenoid, operational factors, contact material, reliability, switching durability, reliability of contact, resistance welding.

During the operation of electromagnetic actuators under various influences which determined mode of operation and the environment. Therefore, it is necessary to have information about the five or six most important factors that determine the state starter, while the impact on the starter several dozen operational factors. In laboratory studies starters, new contact materials account for the influence of all factors and properties of materials is a complex multidimensional problem requires the setting of a large number of experiments.

Fig. 1 shows the classification performance and the main factors influencing the reliability starters. Reliability for starters determined by reliability $P_k(t)$, T_c , T_m ; durability $T_{pyk}\%$, $T_{cny}\%$; persistence $T_{3y}\%$; maintainability T_B [2, 4, 5, 7].

The purpose of research - identifying the most influential factors on the performance parameters of reliability electromagnetic starter, switching durability, reliability of contact, resistance welding.

Materials and methods research. In our view, the most significant for starters 1 and 2 values (with $I_{HOM} \leq 25$ A), operating in hostile environments livestock buildings, there are options switching device, wear resistance (electrical T_c , mechanical T_m), corrosion

resistance (reliability of contact), characterized stable contact resistance over time and resistance welding [3], as more than 60% of failures starters is due to failures switching devices [6, 8].

The presence in the environment chemically active impurities, humidity and temperature directly affect the corrosion resistance of contact materials, defined chemical properties (primarily electrode potential). Here is the basic mechanism of electrochemical corrosion when contact elements form a galvanic couple. Switching current only increases the corrosion processes that occur in the working surfaces.

The value specified reliability indices starter substantially affects a number of operational factors, so it is advisable to identify the significance of factors influence the degree of reliability and starter switching device. One of the most effective methods of screening and selection insignificant important factor is their ranking (hosted by descending order of importance), the essence of which is based on an assessment specialists, experts degree of influence of each factor on a particular option reliability [1].

Results. In an analysis of published data on the state of operation starters [3, 8], we have identified a number of factors ($n = 12$) have the most significant impact on the reliability of the above options electromagnetic starters. Determination of average and extreme values of factors is based on the analysis of operational data using methods of mathematical statistics. The most probable values of the factors listed in Table. 1.

To certain factors are effective factors influence the electrical (voltage, current, current family, nature load mode), mechanical stress factors (contact pressure, speed and circuit breaking contact material contacts), and climatic factors influence.

Ranking factors for each of the defining parameters is carried out on the basis of published data [7, 8] on the basis of questionnaires that are filled with experts and specialists in the field of operation of electrical equipment and electrical contacts research (research staff $m = 10$). Consistency estimates and opinions of experts estimated coefficient of concordance $0 \leq w \leq 1$; when $w = 0$, it notes the absence of any consensus (consistency) expert assessments; when $w = 1$, - says full harmony [1]. The significance of the coefficient w estimated by the criterion « χ^2 ». The hypothesis of the presence of consent is refuted (confirmed) in the chosen significance level $\alpha = 0,05$ if χ^2_p estimated

value of more than tabular ($\chi^2_p = 4.58$ at $\alpha = 0,05$ and number of degrees of freedom $f = n - 1 = 11$).

The results of questionnaire data and calculations concordance coefficients are given in Table. 2. Given that for all cases examined ranking factors $\chi^2_p > \chi^2_r$ (at $\alpha = 0.05$ and $f = 11$), the proven importance of concordance coefficients, ie there is a good consistency. According to the data built step chart ranks (X-axis postponed factors, and the vertical axis - the amounts ranks $\sum_{j=1}^m a_{ij}$). The higher the amount ranks factor, the less it is significant. The chart ranks sedate place as far as reducing the significance of factors [9]. These factors ranging interpreted in graphical form in Figure 2.

Conclusions

1. Factors that influence each parameter separately and efficiency switching device starter as a whole (collectively the three parameters) can be divided into three main groups: major, minor and major.

2. The applied method priori rank correlation factors influencing the reliability parameters starter allows for mining research methodology starters highlight the value of current strength material contacts and the presence of aggressive environment as the main factors determining the reliability of electromagnetic switching devices starters.

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A classification of operational factors influence the electromagnetic starter, revealed the importance of factors, the extent of their effect on the reliability of the starter and the switching device.

The rank correlation, electromagnetic starter, operational factors, contact material, the reliability index, patch wear resistance, reliability contacting, resistance welding.