

TEST AND ANALYSIS OF RELIABILITY FOR ELECTROMAGNETIC RELAY

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ABSTRACT

The electromagnetic relays, type 155, were tested for their reliability in our paper. Our purpose is to improve the reliability of the relay. The test load was DC 24V×0.1A. During the test, the contact voltage drop, closing time and opening time were monitored and measured. In the end of test, we estimated the reliability of relay according to the results of test, and analyzed the failure mode. The failure mechanisms were analyzed by observing the surfaces of failure contacts. Base on the test results, the failure mode is:

- (1) Random failure: the relay can return to normal after there is one or several bad contact.
- (2) Permanent failure: the relay can not return to normal when the relay is failure.
- (3) Mechanical failure: the mechanical structure of the relay breaks off.

In the test, the relay of the breakdown of the contact reed is over a half of the total failure relays. The contact reed is a key part of relay, and the quality of the reed should be improved in order to increase the flexibility of the reed. The fatigue fracture of the reed emerges under the alternate direct stress and alternate shearing stress during the relay is operated. The fatigue life of the reed should be improved by reducing the level of the stress or by changing the active region of force.

We put forward a method for reducing the failure rate of the relay. It is to change the joint form of the contact reed with bracket. In our paper, the stress of the reed is analyzed in detail. The active region of the maximum stress during the make-off-contact closing is different from that the make-on-contact closing in our new joint form. The maximum stress is reduced when the make-off-contact close in our new joint form. The fracture failure of reed is reduced and the electrical characteristic of the relay is not changed. The mechanical life and the electrical life are improved.

Key Words: Electromagnetic Relay, Reliability Test, Reliability Analysis