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DEPARTMENT OF DEFENSE

TEST METHOD STANDARD

METHOD 311, LIFE, LOW LEVEL SWITCHING

AMSC N/A

FSC 59GP

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense.

2. This entire standard has been revised. This revision has resulted in many changes to the format, but the most significant one is the splitting the document into test methods. See MIL-STD-202 for the change summary.

3. Comments, suggestions, or questions on this document should be emailed to std202@dla.mil or addressed to: Commander, Defense Logistics Agency, DLA Land and Maritime, ATTN: VAT, P.O. Box 3990, Columbus, OH 43218–3990. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

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METHOD 311
LIFE, LOW LEVEL SWITCHING

1. SCOPE

1.1 Purpose. This test is conducted for the purpose of determining electrical contact reliability under low-level switching conditions in the environment in which the contacts operate. A low level switching circuit is one in which the voltage and stored energy are sufficiently small so that the resistance of a pair of contacts is not affected by electrical phenomena associated with the electrical current flow or the switching. Such a circuit is also one where the voltage or the current is too low to cause any physical change in the contacts; contact resistance can only be affected by changes in the contacts caused by mechanical action on the contacts. Electrical loads, which result in arcing across electrical contacts, affect contact surfaces in many ways, mostly favorable to reduction of contact resistance, since insulating films and small rough raised areas on the contact are burned away or melted down, to reform as a more even and larger contact surface. Under low-level conditions, the advantages, as well as the occasional disadvantages of this arcing will be absent. If low-level loads and intermediate or power loads are to be applied to different pairs of contacts on the same component part simultaneously, reliability of the low-level conditions can be impaired due to deposition of foreign materials resulting from vaporization surrounding the contacts operating at larger loads in the same enclosure or in an adjacent area, because of this fact, and because low-level contacts may develop films as a function of their environment, the contacts are tested in an environment similar to that in which they are used. This test in no way reflects the contact capability in the intermediate or "minimum" current area and shall not be considered as a substitute for testing in this area when specified.

2. APPLICABLE DOCUMENTS

This section not applicable to this standard.

3. DEFINTIONS

This section not applicable to this standard.

4. GENERAL REQUIREMENTS

4.1. Apparatus.

4.1.1 Test circuit. Monitoring of the contact resistance of each pair of contacts shall be accomplished on each cycle. A separate monitoring indicator shall be used for each pair of contacts. The apparatus, which cyclically operates the contacts, shall be capable of automatically cycling the contacts at the rate specified. The power source for the open-circuit voltage shall not exceed 30 millivolts dc maximum or peak ac at 10 milliamperes (mA) maximum. Open-circuit voltage is defined as the voltage that would appear at the contacts, when the circuit is energized and when the contacts are open. One means of generating this voltage is to pass a stable adjustable current through a low-ohmage resistor (such as a shunt resistor for an ammeter). This means will provide the low impedance, low voltage, controllable, and well defined voltage source necessary. The current shall be adjusted so that the current through the pair of contacts, when closed is limited to 10 milliamperes, maximum.

4.1.2 Monitoring apparatus. The monitoring apparatus shall be capable of indicating resistances greater than a particular value, as specified. Care should be exercised so as to minimize any loading effects by the monitoring apparatus such as current surges as a result of shunt capacitance of shield wire or instrumentation current to the monitoring indicator. During each closure, the contact potential shall be monitored for at least 50 percent of the time contacts are closed. The apparatus shall provide and record, either manually or automatically, the following information:

a. Number of contact closures with contact load applied.

b. If required, number of times the contacts have performed as specified prior to the first failure to perform as specified.

c. Number of times the contacts have failed to perform as specified, i.e., the number of "misses".

d. Sticking of contacts, when in the "open" condition, unless otherwise specified. Sticking of contacts shall be defined as failure to reach 90 percent of the open-circuit voltage.

4.2. Procedure. Each pair of contacts shall be operated for the number of cycles specified at the specified cycling rate with the required test load (see 4.1) applied. The contact resistance shall be continuously monitored using the apparatus in 4.1.1 and 4.1.2.

5. DETAILED REQUIREMENTS

5.1. Summary. The following details are to be specified in the individual specification:

a. If applicable, specify environment, e.g., temperature, humidity, pressure, composition of atmosphere, and any other special environmental conditions (see 1).

b. Number of "misses" allowed which will be considered a failure (see 4.1).

c. Maximum contact resistance allowed (see 4.1.1).

d. If monitoring of contacts for sticking is not applicable (see 4.1.2).

e. Number of cycles of operation and cycling rate (see 4.2).

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Supersession data. The main body and 38 parts of this revision of MIL-STD-202 replace superseded MIL-STD-202.

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Army - CR
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DLA - CC

Review activities:
Army - AR, AT, AV, CR4, MI, SM, TE
Navy - AS, OS, SH
Air Force - 19, 99
NSA - NS

Preparing activity:
DLA – CC

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