

INCH-POUND

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SUPERSEDING

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(see 6.1)

DEPARTMENT OF DEFENSE
TEST METHOD STANDARD
METHOD 302, INSULATION RESISTANCE



AMSC N/A

FSC 59GP



MIL-STD-202-302

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 302
INSULATION RESISTANCE

1. SCOPE

1.1 Purpose. This test is to measure the resistance offered by the insulating members of a component part to an impressed direct voltage tending to produce a leakage of current through or on the surface of these members. A knowledge of insulation resistance is important, even when the values are comparatively high, as these values may be limiting factors in the design of high-impedance circuits. Low insulation resistances, by permitting the flow of large leakage currents, can disturb the operation of circuits intended to be isolated, for example, by forming feedback loops. Excessive leakage currents can eventually lead to deterioration of the insulation by heating or by direct-current electrolysis. Insulation resistance measurements should not be considered the equivalent of dielectric withstanding voltage or electric breakdown tests. A clean, dry insulation may have a high insulation resistance, and yet possess a mechanical fault that would cause failure in the dielectric withstanding voltage test. Conversely, a dirty, deteriorated insulation with a low insulation resistance might not break down under a high potential. Since insulating members composed of different materials or combinations of materials may have inherently different insulation resistances, the numerical value of measured insulation resistance cannot properly be taken as a direct measure of the degree of cleanliness or absence of deterioration. The test is especially helpful in determining the extent to which insulating properties are affected by deteriorative influences, such as heat, moisture, dirt, oxidation, or loss of volatile materials.

1.2 Factors affecting use. Factors affecting insulation resistance measurements include temperature, humidity, residual charges, charging currents of time constant of instrument and measured circuit, test voltage, previous conditioning, and duration of uninterrupted test voltage application (electrification time). In connection with this last-named factor, it is characteristic of certain components (for example, capacitors and cables) for the current to usually fall from an instantaneous high value to a steady lower value at a rate of decay which depends on such factors as test voltage, temperature, insulating materials, capacitance, and external circuit resistance. Consequently, the measured insulation resistance will increase for an appreciable time as test voltage is applied uninterruptedly. Because of this phenomenon, it may take many minutes to approach maximum insulation resistance readings, but specifications usually require that readings be made after a specified time, such as 1 or 2 minutes. This shortens the testing time considerably while still permitting significant test results, provided the insulation resistance is reasonably close to steady-state value, the current versus time curve is known, or suitable correction factors are applied to these measurements. For certain components, a steady instrument reading may be obtained in a matter of seconds. When insulation resistance measurements are made before and after a test, both measurements should be made under the same conditions.

2. APPLICABLE DOCUMENTS

This section not applicable to this standard.

3. DEFINITIONS

This section not applicable to this standard.

4. GENERAL REQUIREMENTS

4.1. Apparatus. Insulation resistance measurements shall be made on an apparatus suitable for the characteristics of the component to be measured such as a megohm bridge, megohm-meter, insulation resistance test set, or other suitable apparatus. Unless otherwise specified, the direct potential applied to the specimen shall be that indicated by one of the following test condition letters, as specified:

<u>Test condition</u>	<u>Test potential</u>
A	100 volts $\pm 10\%$
B	500 volts $\pm 10\%$
C	1,000 volts $\pm 10\%$

For inplant quality conformance testing, any voltage may be used provided it is equal to or greater than the minimum potential allowed by the applicable test condition. Unless otherwise specified, the measurement error at the insulation resistance value required shall not exceed 10 percent. Proper guarding techniques shall be used to prevent erroneous readings due to leakage along undesired paths.

4.2. Procedure. When special preparations or conditions such as special test fixtures, reconnections, grounding, isolation, low atmospheric pressure, humidity, or immersion in water are required, they shall be specified. Insulation resistance measurements shall be made between the mutually insulated points or between insulated points and ground, as specified. When electrification time is a factor, the insulation resistance measurements shall be made immediately after a 2 minute period of uninterrupted test voltage application, unless otherwise specified. However, if the instrument reading indicates that an insulation resistance meets the specified limit, and is steady or increasing, the test may be terminated before the end of the specified period. When more than one measurement is specified, subsequent measurements of insulation resistance shall be made using the same polarity as the initial measurements.

5. DETAILED REQUIREMENTS

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

- a. Test condition letter, or other test potential, if required (see 4.1).
- b. Special preparations or conditions, if required (see 4.2).
- c. Points of measurement (see 4.2).
- d. Electrification time, if other than 2 minutes (see 4.2).
- e. Measurement error at the insulation resistance value required, if other than 10 percent (see 4.1).

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.

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA – CC

(Project 59GP-2015-032)

Review activities:

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

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil/>