



Standard Guide for Measuring Voltage Drop on Closed Arcing Contacts¹

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1. Scope

1.1 This guide describes recommended procedures to accurately measure voltage drop across current carrying contacts and the parameters to be documented in order to effectively record the results. Such contacts normally carry current greater than 1 amp. The applicability of these procedures to contacts carrying smaller currents should be evaluated prior to application to such devices. Contacts carrying small current may also be evaluated using Test Method B 539 to measure contact resistance.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 6.

2. Referenced Documents

2.1

B 539 Test Methods for Measuring Contact Resistance of Electrical Connections (Static Contacts)²

B 542 Terminology Relating to Electrical Contacts and Their Use²

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B 542.

4. Instrument Selection

4.1 Generally, a low-impedance instrument will give greater accuracy. Since, these instruments are subject to serious damage by over-voltage, such as may occur when contacts are accidentally opened, due care should be taken in a proper instrument range selection. Many of the high-impedance meters, such as some electronic voltmeters, are not damaged by overvoltage and when used with the precautions pointed out in this recommended practice can be quite accurate. Instruments

may also be protected by using the voltage-limiting circuit at the instrument input. Two types of meters are generally used and can be classified as self-contained voltmeters, or voltmeters that require an external power source.

5. Significance and Use

5.1 This guide covers the factors to be controlled, precautions and documentation necessary to measure and report the voltage drop across closed current-carrying contacts. The voltage drop is an indication of the efficiency of the contact interfaces in carrying a specified current. This efficiency can be adversely effected by any insulating areas within the contact interface. Circuits which involve substantial current and low independence can be influenced by this contact property.

6. Instrumentation Precautions

6.1 If a self-contained instrument is used, the following precautions should be observed:

6.1.1 The voltmeter leads should be connected as shown in Fig. 1 as close to the test contacts as possible.

6.1.2 The leads should be as short as possible, or calibrated with the meter, and shielded to reduce the effect of stray pick-up voltages.

6.1.3 The voltmeter input impedance should be 1000 Ω or less. This will load the circuit sufficiently to reduce the effects of stray-voltage pickup in the instrument leads. The input impedance of high-impedance meter can be reduced by placing a 1000-Ω resistor, *B*, across its input terminals as shown in Fig. 1.

6.1.4 Before measurements are made, the voltmeter leads should be shorted together at point *C*. With the voltmeter leads shorted in this position, the test current should be caused to flow in the circuit. If the voltmeter deflects, it may be caused by induction from the load circuit to the internal components of the meter. This may be minimized by orienting the meter, or relocating the meter (that is, moving it away from the circuit) until minimum meter deflection is observed. If necessary, place conductive shielding between the meter and the circuit.

6.2 If a electronic voltmeter requiring an external power supply is used, the additional precautions listed below should be observed:

¹ This test method is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.05 on Precious Metals.

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² *Annual Book of ASTM Standards*, Vol 02.04.