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STANDARDS

Interface Practices Subcommittee

SCTE STANDARD

SCTE 152 2019

Test Procedure for Contact Resistance Measurement of Mainline Plug Interface

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140 Philips Road
Exton, PA 19341

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1. Introduction

1.1. Executive Summary

The purpose of this test procedure is to measure the resistance between the contact of the connector and cable interfaces.

1.2. Scope

The term contact resistance refers to the contribution to the total resistance of a system which can be attributed to the contacting interfaces of electrical leads and connections as opposed to the intrinsic resistance, which is an inherent property, independent of the measurement method.

High resistance contacts may cause excessive energy losses, overheating and possibly common path distortions. It is most desirable to have contact resistance as low as possible

The contact resistance is the resistance to the current flow in electrical connections, due to surface conditions in the connection to contact surface, which may lead to poor or bad connection if it is too high, causing different problems in the circuit. Therefore, the contact resistance test measures the resistance of electrical connections in switching devices, breakers, relays, joints, connectors, etc, for finding bad or corroded contacts as a preventive method, or for diagnosis and problem solving

1.3. Benefits

The contact resistance test is very important for contacts that carry large amounts of current (e.g. circuit breakers, busbars, cable joints, etc) as higher contact resistance leads to higher losses, lower current carrying capacity and dangerous hot spots in the substation, so that the contact resistance test is used for detecting and preventing future problems, checking the circuit or equipment condition.

1.4. Intended Audience

The intended audience for this document is for development/design engineers, technical operations and installers.

1.5. Areas for Further Investigation or to be Added in Future Versions

No changes are intended for future versions.

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents might not be compatible with the referenced version.

2.1. SCTE References

- No normative references are applicable

2.2. Standards from Other Organizations

- No normative references are applicable

2.3. Published Materials

- No normative references are applicable

3. Informative References

The following documents might provide valuable information to the reader but are not required when complying with this document.

3.1. SCTE References

- No informative references are applicable.

3.2. Standards from Other Organizations

- http://www.iemworldwide.com/pdf/ansi-neta-ats-2009.pdf

3.3. Published Materials

- https://www.ipc.org/TM/3-1A.pdf
- https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6922846.

4. Compliance Notation

shall	This word or the adjective "***required***" means that the item is an absolute requirement of this document.
shall not	This phrase means that the item is an absolute prohibition of this document.
forbidden	This word means the value specified shall never be used.
should	This word or the adjective "*recommended*" means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
should not	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
may	This word or the adjective "*optional*" means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.
deprecated	Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of this document. Implementations should avoid use of deprecated features.

5. Test Samples

5.1. Sample Preparation

5.1.1. Prepare one end of an appropriately sized cable in accordance with the connector manufacturer's instruction. If the cable is jacketed remove all jacket material using the appropriate jacket stripping tool. For QR cables leave the jacket on to facilitate proper coring and preparation.

5.1.2. Prepare the remaining cable end to meet the dimensions depicted in Figure 1. Dimensions A and B are the connector manufacturers recommended center conductor protrusion and core depth respectively.

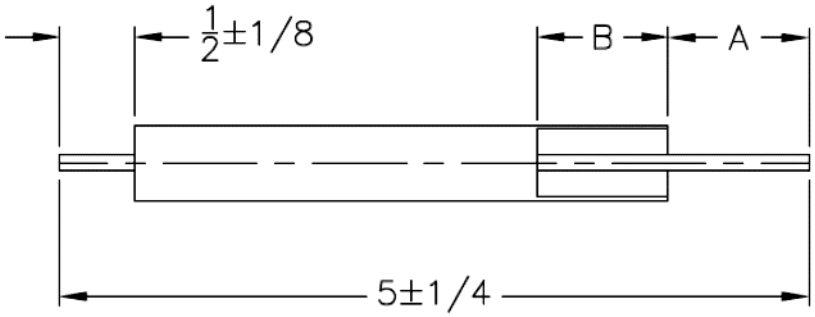

Figure 1 - Cable End Dimensions

5.1.3. Install the connector sample in accordance with manufacturer's instruction.

5.1.4. For QR cables, remove the remaining jacket to the back of the connector.

6. Equipment

6.1. 4-wire resistance measurement device capable of measuring in the micro-ohm to milliohm range. The measurement device should be able to clamp the open circuit test voltage to 20 mV maximum (dry circuit condition) to avoid puncturing surface oxides and films in the connector contact area. Example: Keithley Model 580 Micro-Ohmmeter or equivalent with appropriate clip leads and probes to facilitate stable attachment to the device under test.

7. Procedure

7.1. Turn on the test equipment and allow an adequate warm-up period in accordance with the equipment manufacturer's instruction. Set the equipment parameters as follows:

7.1.1. Drive- Pulsed (Pulsed drive cancels thermal offsets in the test lead connections and the device under test)

7.1.2. Polarity- + (Positive)

7.1.3. Dry circuit test (20 mV Max.)

7.1.4. Range- 200 mΩ

7.2. Null out the test leads in accordance with the test equipment manufacturer's instructions to establish a "zero" baseline reading.

7.3. Center conductor resistance measurement

7.3.1. Attach one test lead to the connector center pin within ¼" of the 5/8-24 threaded interface. Attach the remaining test lead to the cable center conductor within ¼" of the cable outer conductor/dielectric. Refer to Figure 2.

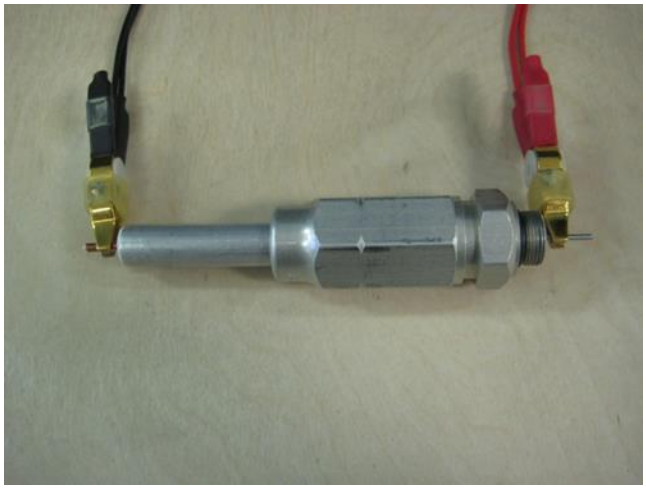

Figure 2 - Test Leads Attach Points (1)

7.3.2. Allow reading to stabilize and record the resistance value on the Data Sheet.

7.4. Outer conductor resistance measurement

7.4.1. Attach one test lead to the connector as near to the end of the 5/8-24 threaded interface as practical. Attach the remaining test lead to the cable outer conductor within ¼" of the conductor back nut. Refer to Figure 3.

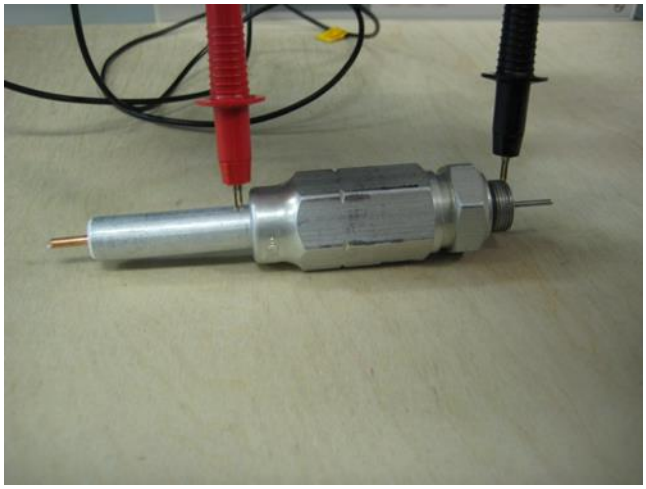

Figure 3 - Test Leads Attach Points (2)

7.4.2. Allow reading to stabilize and record the resistance value on the Data Sheet.

8. Conductor Resistance Data Sheet

Sample Description:		
Equipment used:		
Test conditions:		
Sample #	Center Conductor Resistance, mΩ	Outer Conductor Resistance, mΩ

Comments/Observations:	
Technician:	Date: