Designation: B1004 – 16

Standard Practice for Contact Performance Classification of Electrical Connection Systems[1]

This standard is issued under the fixed designation B1004; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice provides a method of specifying performance requirements for (or reporting test results of) electrical contact and connection systems. Both conductor and connector system performance may be specified by this practice, separately or in combination.

1.2 This practice may be used for separable or permanent contacts employing metallic conducting components.

1.3 This practice is applicable to both signal and power applications.

1.4 This practice is intended to be used for specifying performance of connectors and connection systems that are marketed for general public and trade application, as for instance for use in building wiring, electronics, and vehicles.

1.5 This practice is not intended to be used to specifying the performance of connection systems for specialized applications, such as military, industrial, aircraft, power distribution, and medical apparatus.

1.6 This practice does not specify the sample preparation or test sequences required for determining contact performance. It is the responsibility of the user of this practice to determine the applied test sequence(s) appropriate for the application.

1.7 *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 become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provide by the manufacturer, to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B539 Test Methods for Measuring Resistance of Electrical Connections (Static Contacts)

B542 Terminology Relating to Electrical Contacts and Their Use

B812 Test Method for Resistance to Environmental Degradation of Electrical Pressure Connections Involving Aluminum and Intended for Residential Applications

3. Terminology

3.1 Terms used in this practice are defined in Terminology B542 except as noted in 3.2.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *conductor, n*—electrically conductive member carrying current to a contact interface. Examples are wire and cable, busbar, and conductive paths on an etched printed circuit board.

3.2.2 *connection performance, n*—the condition and behavior of the contact interface(s) within the connection as indicated by electrical resistance and resistance change with time under the applied conditions.

3.2.3 *connection system, n*—the completed electrical contact interface and all associated parts, assembled as prescribed by the manufacturer(s) for the intended service.

3.2.4 *intended conditions of use, n*—any combination of applied electrical, environmental, and other conditions associated with the intended and rated application.

3.2.5 *nonincreasing, adj*—as applied to connection resistance values, mathematically, a series of numbers that are bounded above.

[1] This practice is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.11 on Electrical Contact Test Methods.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4. Performance Classification Practice

4.1 The performance specification (or reporting) statement consists of an alphabetic classification, a brief statement of the intended conditions of use, and, for Class B only, the expected minimum years of life in the intended application. Class A and Class B statements shall include reference to a published standard or method by which the performance classification has been determined.

4.1.1 *Class A*—A connection system for which the resistance is predicted to be nonincreasing for an unlimited time under the intended conditions of use, when installed in accordance with the manufacturer's instructions. The classification, the intended use, and a reference to the published standard(s) or method(s) used to determine the classification are stated. For critical applications (where life safety is a concern, for instance) users of this classification are advised to state the connection resistance boundary that is considered to be acceptable for the particular application.

4.1.1.1 Example of use: "Class A, for residential branch circuit copper wiring, dry locations, 0.05 ohm, Standard XXXX."

4.1.2 *Class B-xx*—A connection system for which the resistance is predicted to be nonincreasing for a defined minimum number ("xx") of years under the intended conditions of use, when installed in accordance with the manufacturer's instructions. The classification, the predicted life in years, the intended use, and a reference to the published standard(s) or method(s) used to determine the classification are stated. For critical applications (where life safety is a concern, for instance) users of this classification are advised to state the connection resistance boundary that is considered to be acceptable for the particular application.

4.1.2.1 Example of use: "Class B-25, for low-voltage underground direct burial cable splices, Method YYYY."

4.1.3 *Class C*—A connection system for which no prediction of performance is made for the intended conditions of use.

4.1.3.1 Example of use: "Class C, for boat trailer lighting."

4.2 A given connection system may have different performance classifications for different applications.

5. Significance and Use

5.1 This practice is based on the use of electrical resistance as an indicator of contact performance. This is the fundamental physical attribute that reflects the condition of the electrical contact interface(s) within a connection. For practical current-carrying electrical connections, resistance may be calculated from potential drop measurements, as described, for example, in Test Method B539 and B812.

5.2 This practice accommodates the use of multiple test methods, as may be required to predict performance in a given application.

5.3 This practice applies only to the performance of the current-carrying contact interface(s). It does not characterize the performance of insulating materials or other components of a complete connection system.

5.4 Specifiers may use the performance classification as a requirement for a given application.

5.5 Manufacturers may use the performance classification to reflect the relative quality of their products.

6. Precision and Bias

6.1 Precision and bias are those of the test method(s) applied.

7. Keywords

7.1 conductor; connection resistance; connector; contact; electrical connection system; electrical contact; metallic; performance classification;