



Standard Test Method for Monitoring Atmospheric Corrosion Tests by Electrical Resistance Probes¹

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1. Scope

1.1 This test method provides a means for monitoring corrosivity of environmental tests that involve exposure to corrosive gases.

1.2 This test method uses a resistance monitor (RM) probe fabricated from a chosen metal conductor, with one conductor segment uncovered to permit exposure of the chosen metal conductor to the corrosive gas mixture and the second conductor segment covered to protect the metal conductor of this segment from direct attack by the corrosive gas mixture. The covered conductor segment provides a reference for evaluating changes in the uncovered segment. The ratio of the resistance of the exposed segment to that of the covered segment provides a measure of the amount of metal conductor that has reacted with the corrosive gas test environment to form poorly conducting corrosion product, thus providing a measure of test corrosivity.

1.3 Resistance monitoring is applicable to a broad range of test conditions by selection of the appropriate metal conductor and initial metal thickness.

1.4 This method is similar in intent to Test Methods B 808.

1.5 *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 Material Safety Data Sheet for this product/material as provided 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:

B 808 Test Method for Monitoring of Atmospheric Corrosion Chambers by Quartz Crystal Microbalances²

B 810 Test Method for Calibration of Atmospheric Corrosion Test Chambers by Change in Mass of Copper Coupons²

B 827 Practice for Conducting Mixed Flowing Gas (MFG) Environmental Tests²

G 96 Guide for On-Line Monitoring of Corrosion in Plant Equipment (Electrical and Electrochemical Methods)³

3. Summary of Test Method

3.1 The corrosivity of an atmospheric corrosion test such as a mixed flowing gas (MFG) type test is measured by monitoring the loss in electrical conductivity of a metal element whose surface corrodes to form poorly conducting corrosion product. This corrosion product consumes metal from a conduction path causing an increase in electrical resistance. The resistance of the degraded conduction path is compared with a similar path whose surface is covered to prevent corrosion. This comparison resistance also provides a temperature correction reference. The ratio of the electrical resistance of the path exposed to the corrosive gases to that of the covered path is monitored during the test and compared to an expected ratio-versus-time curve to establish the relationship of the test corrosivity to expected test corrosivity. Alternatively, the ratio-versus-time curve for a given atmosphere can be compared with the behavior of other corrosive atmospheres to evaluate the relative corrosivity of the various atmospheres.

4. Significance and Use

4.1 Corrosivity monitoring of test environments provides a means to monitor an integrated value of test corrosivity which cannot be evaluated from test parameters themselves, such as temperature, humidity, and gas concentration. As such the monitor value can be used for specification purposes such as test validation. Electrical resistance monitoring of conductors exposed to corrosive media is a well-established practice.^{4,5,6,7}

4.2 The resistance method assumes uniform corrosion over the entire surface of the exposed metal conductor segment.

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

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² Annual Book of ASTM Standards, Vol 03.04.

³ Annual Book of ASTM Standards, Vol 03.02.

⁴ ASTM G 96, Guide for On-Line Monitoring of Corrosion in Plant Equipment (Electrical and Electrochemical Methods).

