



IPC-TM-650 TEST METHODS MANUAL

1 Scope This test method is used to determine the effects of long term operation of components in atmospheres containing industrial gaseous pollutants. It consists of exposure to a flowing-gas humid atmosphere containing SO₂, H₂S, and HO₂ in concentrations of 200 parts per billion (ppb). This corresponds to a worst-case polluted atmosphere, and is an accelerated exposure to normal, average pollutant level atmosphere. An acceleration factor of 30-40 is associated with this test.

1.2 To further simulate and accelerate conditions obtained in operating environments, the test also involves temperature and humidity cycling, so as to cause breathing and moisture condensation on the test samples.

2 Applicable Documents None

3 Test Specimen

3.1 Any pre-production or production samples wired and mated as intended for actual use

4 Apparatus

4.1 Test chamber and its associated control equipment capable of producing and maintaining the conditions of 4.1.1 and 4.1.2

4.1.1 Capable of cycling the temperature between 68°C and 26°C with the following schedule:

- Eight hours at 68°C
- One hour transition to 26°C
- Two hours at 26°C
- One hour transition to 68°C

These 12-hour cycles are to be repeated continuously for the duration of time specified for the exposure.

4.1.2 Capable of maintaining 80% RH ± 5% RH during the 68°C dwell time. Uncontrolled during temperature transitions so as to allow condensation on the samples.

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4.2 Gaseous Atmospheric Pollutants Concentrations of 200 ppb in normal air (N₂ - 20% O₂) of the following pollutants shall be maintained in the exposure chamber at all times:

- H₂S (200 ppb)
- SO₂ (200 ppb)
- NO₂ (200 ppb)

A convenient and satisfactory way of producing this environment is the "Battelle Flowing Gas System." In this system, the pollutant concentrations are maintained through the use of permeation tubes, which are small Teflon tubing sections, about 2 cm long, sealed at both ends, and containing the pollutant of interest as a liquid at room temperature. These permeation tubes are placed in the main air stream, which feeds the exposure chamber, and the concentrations of the pollutants are determined by the diffusion rates of the gas out of the permeation tubes. At a constant flow rate and temperature of the main air stream, the concentration of pollutants will be constant. Periodic weighing of the permeation tubes may do pollutant gas "analysis."

The flow rate of the main air stream is such that the exposure chamber volume is exchanged approximately every 30 minutes.

5 Procedure

5.1 Wire and mate the test specimen as in normal intended operation during exposure in this test.

5.2 The duration of this test is generally calculated from the expected service lifetime of the product.

5.3 The actual duration of this exposure is to be determined between vendor and user and/or is a part of the applicable product specification. A 60-day exposure in this test corresponds to approximately six years of exposure in normal industrial environments.

6 Notes

6.1 Reference Abbott, W. H., *Effects of Industrial Air Pollutants on Electrical Contact Materials*, Holm Seminar on Electric Contact Phenomena, November 1973.