STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTROTECHNOLOGY

Part 2—TESTS

TEST Kc—SULPHUR DIOXIDE TEST FOR CONTACTS AND CONNECTIONS

This test shall be read in conjunction with AS 1099.1, General.

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FOREWORD

The purpose of the test is to determine the influence of atmospheres containing sulphur dioxide on the contact properties of precious metals other than silver and some of its alloys, when used as electrical contacts or connections. The test is intended to provide an accelerated means of assessing the corrosive effects of atmospheres polluted by the combustion products of, for example, sulphur contaminated fuels. It is considered particularly suitable for comparison of products or materials. It is not however, suitable as a general corrosion test, i.e., it should not be used as a method for predicting the likely behaviour or particular types of contact or connections in a particular atmosphere.

The test method of this industrial atmosphere test is technically identical with that of IEC 68-2-42:1976. Appendix C, which provides a method of measurement for electrical contact resistance, has been added.

Background information on the subject of accelerated corrosion testing generally is provided in AS 1099.3.7.

TEST

1 SCOPE AND OBJECT. This standard method sets out a test procedure to determine the influence of atmospheres containing sulphur dioxide on the contact properties of precious metal or precious-metal-covered contacts. The procedure excludes contacts consisting of silver and some of its alloys, but checks wrapped or crimped connections with regard to their continuity or effectiveness.

In all tests, the major criteria of performance will be the *change in contact resistance* caused by exposure to the sulphur dioxide containing atmosphere.

2 GENERAL. This test is intended to provide an accelerated means of assessing the corrosive effects on contacts and connections of atmospheres polluted with sulphur combustion products and is particularly suitable for giving information on a comparative basis. It is not suitable as a general corrosion test, i.e. it may not predict the behaviour of contacts or connections in specific industrial atmospheres.

3 TEST CHAMBER. The test chamber and its auxiliary parts shall be made of materials that do not react with or absorb sulphur dioxide and which do not influence the corrosive effects of the test atmosphere. The test atmosphere shall be introduced to and leave the chamber through tubes with sufficiently large diameters such that the total flow through the chamber is at least three, but not more than five, changes of the atmosphere per hour. The exhaust from the chamber shall not be allowed to enter the laboratory.

The detailed construction of the chamber including the method of producing the test atmosphere is optional provided that—

(a) the conditions in that part of the chamber occupied by the specimens are within the specified limits;

(b) the specimens under test are protected from direct contact with the incoming gas flow;

(c) arrangements are made to move the specimens through the test atmosphere at an average rate of 20 m/h to 60 m/h (approximately 6 mm/s to 17 mm/s) or alternatively to gently stir the atmosphere, obtaining a similar relative velocity between atmosphere and specimen;

(d) condensation does not occur on the inside walls of the test chamber.

Examples for suitable arrangements of test apparatus are given in Appendices A and B.

4 TEST ATMOSPHERE.

4.1 Composition. The composition of the atmosphere within the test chamber shall satisfy the following conditions:

(a) Sulphur dioxide : 25 ± 5 mm^3/L (see Note 1).

(b) Carbon dioxide : 4500 mm^3/L maximum.

(c) Temperature : 25± 2°C.

(d) Relative humidity : 75 ± 5 percent (see Note 2).

NOTES:

1. This is taken as the total oxides of sulphur expressed as SO_2. Small concentrations of sulphur other than SO_2 (such as SO_3) are permitted to be present to a maximum concentration of 1 percent of the total sulphur oxides.
2. The relative humidity is to be held as close as possible to 75 percent, but must in no case exceed 80 percent nor fall below 70 percent.

4.2 Method of Production. The test atmosphere may be obtained by either of the following methods:

(a) By mixing directly the necessary constituents in such a way as to ensure a homogeneous mixture. More than one mixing stage may be necessary to obtain a homogeneous distribution of the small quantity of SO_2. An example for such a process is given in Appendix A.

(b) By generating the SO_2 by a burning process and adjusting the resulting gas mixture to the specified composition. An example for such a process is given in Appendix B.

The test report shall state which of the two methods for obtaining the test atmosphere has been used.

5 INITIAL MEASUREMENTS. The specimens under test shall not be cleaned in any way unless required by the manufacturer's instructions, the relevant specification, or agreed upon between the interested parties.

The relevant specification may require that before and after the test, variation of contact resistance measurements shall be carried out in combination with mechanical tests, e.g. shock or vibration tests.

The specimens shall be measured, mechanically checked and subjected to mechanical endurance as required by the relevant specification.

The contact resistance shall be measured by the low-open-circuit voltage method in order to avoid damage to films formed on contact surfaces. One such measuring method suitable for most purposes is given in Appendix C.

6 CONDITIONING. Prior to the commencement of the test, it shall be established by suitable measurements that stable conditions for the concentration of sulphur dioxide, the temperature and the relative humidity have been achieved. Periodic checks shall be made during the test to ensure that these conditions are maintained.

Care shall be taken that the specimens are so placed that they do not come into contact with one another and that they do not shield one another from the test atmosphere.

Adequate precautions shall be taken to ensure that the contacts are not disturbed during the exposure period.

Specimens shall be exposed with contacts open and/or closed as prescribed in the relevant specification.

The loading or functioning of the specimens should be permitted when prescribed in the relevant specification.

The specimens shall be continuously exposed to the conditioning atmosphere for 4, 10 or 21 days as required by the relevant specification.

7 FINAL MEASUREMENTS. The specimens shall be removed from the chamber and stored under standard recovery conditions for not less than 1 h and not more than 2 h before contact resistance measurements are made. Adequate precautions shall be taken to ensure that the contacts are not disturbed. The