STANDARDS ASSOCIATION OF AUSTRALIA

# Australian Standard
# for
# BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTROTECHNOLOGY

## Part 2—TESTS

## TEST Sa—SIMULATED SOLAR RADIATION

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

## FOREWORD

The purpose of this standard test procedure is to simulate the various effects of solar radiation at the surface of the earth on the performance of electrical and electronic equipment and components. The major characteristics of the simulated environment are the spectral energy distribution of the sun and the intensity of the received energy, as observed at the earth's surface, in combination with controlled temperature conditions. Attention is drawn to other problems such as sky radiation and wind velocity.

Guidance on methods of achieving the simulated environment necessary to determine the effects of solar radiation is given in AS 1099.3.5.

## TEST

**1 SCOPE AND OBJECT.** This standard method sets out a test procedure to determine the thermal, mechanical, chemical or electrical effects produced on electrical and electronic equipment and components as a result of exposure to solar radiation under the conditions normally experienced at the surface of the earth, by exposure to an environment which simulates as closely as possible the effects of solar radiation.

**2 INITIAL MEASUREMENTS.** The test specimen(s) shall be visually inspected and electrically and mechanically checked, as required by the relevant specification. The results shall be recorded.

**3 TEST APPARATUS.**

**3.1 Test Enclosure.** The enclosure in which the tests are to be carried out shall be provided with means for obtaining, over the prescribed irradiation measurement plane, an irradiance of 1.120 $kW/m^2$ ± 10 percent with the spectral energy distribution given in Table 1. The value of 1.120 $kW/m^2$ shall include any radiation reflected from the test enclosure and received by the specimen under test. It should not include long-wave infrared radiation emitted by the test enclosure (see Clause 5.6.1 of AS 1099.3.5).

NOTE: Where only the thermal effects of solar radiation are of interest, see Clauses 5.2.2 and 5.2.3 of AS 1099.3.5.

**3.2 Test Atmosphere.** Means shall also be provided whereby the specified conditions of temperature, circulation and humidity can be maintained within the enclosure.

NOTE: Circulation of air can significantly reduce the temperature rise of specimens (see Clause 4.4).

**3.3 Temperature Measurement.** The air temperature within the enclosure shall be measured (with adequate shielding from radiated heat) at a point or points in a horizontal plane 0 mm to 50 mm below the prescribed irradiation measurement plane, at half the distance between the specimen under test and the wall of the enclosure, or at 1 m from the specimen, whichever is the lesser.

**4 CONDITIONING.**

**4.1 Mounting of Specimens.** The specimen to be tested shall be placed either on raised supports or on a specified substrate of known thermal conductivity and thermal capacity within the enclosure and so spaced from other specimens as to be completely exposed to the source of radiation or re-radiated heat (see Clause 5.4.6 of AS 1099.3.5).

**4.2 Test Environment.** During the entire test, the irradiation, the temperature within the enclosure, the humidity and any other specified environmental conditions shall be maintained at the levels appropriate to the particular test procedure as called for in the relevant specification.

**4.3 Test Procedures.** The specimen shall be exposed, for the duration called for in the relevant specification, to one of the following test procedures (see Fig. 1):

(a) *Procedure A.* A 24-hour cycle, with 8 h irradiation and 16 h darkness, repeated as required. This gives a total irradiation of 8.96 $kW.h/m^2$ per diurnal cycle, *which approximates to the most severe natural conditions.*