

WITHDRAWN IS
AUGUST 1984

AS 1099.2Z/BM—1980

STANDARDS ASSOCIATION OF AUSTRALIA

INDICATOR
OF ASSOCIATION

Australian Standard
for

30 JUL 1980

MELBOURNE LIBRARY

**BASIC ENVIRONMENTAL TESTING PROCEDURES FOR
ELECTROTECHNOLOGY**

PART 2—TESTS

TEST Z/BM: COMBINED DRY HEAT/LOW AIR PRESSURE TESTS

This test shall be read in conjunction with AS 1099.1, General; AS 1099.2B, Test B: Dry Heat; and AS 1099.2M, Test M: Low Air Pressure.

CONTENTS

	<i>Page</i>
FOREWORD	2
1 SCOPE AND OBJECT	3
2 GENERAL DESCRIPTION	3
3 DESCRIPTION OF TEST APPARATUS	3
4 SEVERITIES	3
5 PRECONDITIONING	3
6 INITIAL MEASUREMENTS	3
7 CONDITIONING	3
8 INTERMEDIATE MEASUREMENTS	4
9 RECOVERY	4
10 FINAL MEASUREMENTS	4
11 INFORMATION TO BE GIVEN IN THE RELEVANT SPECIFICATION	4

FOREWORD

The purpose of this standard test is to provide a composite test procedure for the allocation of combined dry heat (with gradual change of temperature) and low air pressure tests for both heat-dissipating and non-heat-dissipating specimens.

The object of the test is to determine the ability of components or equipments or other articles to be stored and used under a simultaneously applied combination of high temperature and low air pressure.

This combined test should normally be used only if the effects of combined environments will not be revealed by subjecting the specimen to single environments. The procedures given are limited to cases such that specimens achieve temperature stability during the test procedure.

Where heat-dissipating specimens are concerned this procedure is limited to the testing of one specimen at a time.

The test procedure applies to air pressure down to about 10 mb. At air pressures below 10 mb, phenomena not taken into account in the design of this test procedure become important, e.g. the relationship between altitude, pressure and temperature has not been indicated. Such data should be obtained from other sources.

The guidance given in the introduction to AS 1099.2B, for the application of tests for non-heat-dissipating specimens versus tests for heat-dissipating specimens applies.

NOTE: Non-heat-dissipating specimens are defined as in Clause 3.6.1 of AS 1099.1. The measurements of hottest spot temperature should not be made at reduced pressure.

Heat-dissipating specimens should preferably be tested without forced air circulation as for AS 1099.2B.

Reference may be necessary to the following standards:

- AS 1099 Basic environmental testing procedures for electrotechnology
- 1099.1: Part 1—General
- 1099.2: Part 2—Tests, Test B, Dry heat
- 1099.2: Part 2—Tests, Test M: Low air pressure
- 1099.3: Part 3—Background information. Section 1—Cold and dry heat tests
- 1099.3: Part 3—Background information. Section 2—Combined temperature/low air pressure

TEST

1 SCOPE AND OBJECT. This standard method sets out a test procedure, the object of which is to provide a standard test to determine the suitability of components, equipments or materials for use and/or storage under a combination of high temperature and low air pressure.

2 GENERAL DESCRIPTION. This test is a combination of Tests Bb or Bd: Dry heat, and Test M: Low air pressure.

The specimen shall be subjected to the appropriate severity of dry heat as specified in the relevant specification. In the case of operational tests, a check shall then be made to ensure that the specimen is capable of operation.

With the temperature maintained at the prescribed value, the chamber air pressure shall then be reduced to the appropriate severity as specified in the relevant specification. These conditions shall be maintained for the specified duration. Test profiles illustrating the procedure are shown in Figs 1A and 1B.

3 DESCRIPTION OF TEST APPARATUS.

3.1 Test Chamber. The chamber shall be capable of maintaining the conditions specified for Test Bb (for non-heat-dissipating specimen) or Test Bd (for heat-dissipating specimen) and for Test M. The requirement for the chamber wall temperature does not apply during periods of temperature or pressure change.

Care shall be taken to avoid air contamination by ancillary equipment and devices and by the air introduced when pressure is restored to normal.

3.2 Mounting. For the testing of a heat-dissipating specimen, the mounting of the test specimen shall comply with the requirements of Clause 4.3.2 of Test Bd.

4 SEVERITIES.

4.1 General. The severities, as indicated by temperature, air pressure and duration of exposure, shall be specified in the relevant specification.

The temperature and low air pressure values, tolerances and durations shall comply with those given in Test Bb or Bd and M. The wider tolerances on temperature ($\pm 3^\circ\text{C}$ up to 100°C and $\pm 5^\circ\text{C}$ up to 200°C) can be accepted for the combined dry heat/low air pressure test regardless of the size of the chamber.

The duration of exposure shall be measured from the time when temperature stability of the specimen has been reached under conditions of low air pressure (see Figs 1A and 1B).

4.2 Preferred Combinations of Temperature, Air Pressure and Duration.

Temperature °C	Air pressure		Duration h
	kPa	mb	
85, 155	4	40	2
55, 85, 155	15	150	2
55	25	250	2
55	55	550	2, 16
55	70	700	2, 16
40	60	600	2

5 PRECONDITIONING. The relevant specification may call for preconditioning.

6 INITIAL MEASUREMENTS. The specimen shall be visually inspected and electrically and mechanically checked as required by the relevant specification. The results shall be recorded.

7 CONDITIONING.

7.1 General.

7.1.1 Heat-dissipating specimens. Heat-dissipating specimens shall preferably be tested without forced air circulation in the chamber according to Test Bd. When the chamber used for testing is large enough to meet the conditions specified in Appendix A of AS 1099.2B and heating of the chamber can only be carried out by circulation of air, Method I with forced air circulation of Test Bd may be applied.

7.1.2 Non-heat-dissipating specimens. Non-heat-dissipating specimens may be tested in a chamber with or without forced air circulation.

7.2 Procedure for Heat-dissipating Specimen without Artificial Cooling of the Specimen and for Non-heat-dissipating Specimen.

7.2.1 Change of temperature.

- (a) The chamber shall be at the temperature of the laboratory. The specimen at the ambient temperature of the laboratory shall be introduced into the chamber in the unpacked, switched-off, 'ready-for-use' state, in its normal position, or as otherwise specified.

If the specimen is heat-dissipating, it shall be switched on or be electrically loaded.

- (b) The temperature within the chamber shall be adjusted to the temperature appropriate to the prescribed severity. The specimen shall be allowed to reach temperature stability.

The rate of change of temperature within the chamber shall not exceed $1^\circ\text{C}/\text{min}$ (see Note), averaged over a period of not more than 5 min.

The test (ambient) temperature shall be measured as in Clause 3.6.2 of AS 1099.1.

NOTE: This maximum rate of change of temperature does not apply to specimens capable of withstanding thermal shock, e.g. specimens normally subjected to Test Ba and capable of withstanding Test Na or Nc. For these specimens chambers suitable for Test Ba may be used.

- (c) For operational tests only:

The specimen shall then be checked to ascertain whether it is capable of functioning in accordance with the relevant specification.

The specimen may remain in the operating condition or be switched off as prescribed by the relevant specification.

NOTE: A specimen may be operating or loaded without dissipating so much heat that its temperature-rise above ambiency makes it necessary to consider it heat-dissipating according to the definition of a heat-dissipating specimen in Clause 3.3 of AS 1099.1

The relevant specification may specify another procedure for the check at high temperature and normal air pressure.