Australian Standard™

Environmental testing

Part 2.51: Tests—Test Z/BFc: Combined dry heat/vibration (sinusoidal) tests for both heat-dissipating and non-heat-dissipating specimens

Standards Australia

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PREFACE

This Standard was prepared by the Standards Australia Committee EL-026, Protective Enclosures and Environmental Testing for Electrical/Electronic Equipment.

The objective of this Standard is to provide the electrotechnology industry with a complete set of environmental test procedures published as a series under AS 60068 *Environmental testing*. This Standard is Part 2.51 of that series.

This Standard is identical with, and has been reproduced from, IEC 60068-2-51:1983, *Environmental testing – Part 2-51: Tests—Test Z/BFc: Combined dry heat/vibration (sinusoidal) tests for both heat-dissipating and non-heat-dissipating specimens*.

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(b) In the source text 'this international standard' should read 'this Australian Standard'.

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In this Standard, the following print types are used:

– requirements proper: in arial type;

– *test specifications: in italic type;*

– explanatory matter: in smaller arial type.

Any international Standard referenced should be replaced by an equivalent Australian Standard when one is available. The availability of equivalent Australian Standards can be determined either from the Standards Australia catalogue or from the Standards Australia website (www.standards.com.au).

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INTRODUCTION

i) General

This standard deals with combined dry heat/vibration (sinusoidal) tests applicable both to heat-dissipating and non-heat-dissipating specimens. It is basically a combination of Test Fc: Vibration (sinusoidal) (IEC 60068-2-6) and Tests B: Dry heat (IEC 60068-2-2).

The procedures are limited to the case of specimens which reach temperature stability during exposure to high temperature conditions.

ii) Vibration

The vibration test involved is basically equivalent to Test Fc. One or more of the endurance procedures of Test Fc may be applied. A vibration response investigation after endurance conditioning is not included in this combined test.

iii) Temperature

Temperature conditions for testing heat-dissipating specimens are intended to subject the specimen to thermal stresses in a manner equivalent to that in free air conditions.

Because of the difficulties in simulating the effect of free air conditions in a test chamber combined with a vibrator, forced air circulation is normally used for this test. Monitoring is made on the hottest surface point of the specimen. The monitoring point and the monitoring temperature are determined by subjecting the specimen to free air conditions with specified ambient temperature before conducting the test.

iv) Related documents

IEC 60068: Basic environmental testing procedures.

IEC 60068-1: Part 1: General and guidance.

IEC 60068-2-2: Part 2: Tests B: Dry heat.

IEC 60068-2-6: Part 2: Test Fc and guidance: Vibration (sinusoidal)

IEC 60068-2-14: Part 2: Test N: Change of temperature.

IEC 60068-2-47: Part 2: Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance.

IEC 60068-3-1: Part 3: Background information – Section One: Cold and dry heat tests.

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Australian Standard

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1 Object

To provide a standard test procedure to determine the suitability of heat-dissipating and non-heat-dissipating components, equipment or other articles for use, storage and transportation under conditions of high temperature combined with vibration.

2 General description

This test is a combination of Tests B: Dry heat, and Test Fc: Vibration (sinusoidal).

NOTE – Tests Bb and Bd require that during the heating and cooling phases of temperature conditioning the rate of change of temperature does not exceed 1 K/min averaged over a period of 5 min. The maximum rate of change of temperature of 1 K/min does not apply to specimens which are capable of withstanding thermal shock, that is specimens which are normally subjected to Test Ba and are capable of withstanding rapid change of temperature Test Na or Nc. For these specimens, chambers capable of maintaining the conditions specified for Test Ba or Bc (sudden change of temperature) may be used.

Unless the Tests B and Fc have been performed (and the results recorded) a vibration test under laboratory temperature conditions is first performed and the specimen is then subjected to the high temperature until temperature stability has been reached, after which it is subjected to the combination of vibration and high temperature. Test profiles are shown in figures 1 and 2.

The vibration environment could be one or more of the following:

a) endurance by sweeping;

b) vibration response investigation plus endurance at those frequencies derived from the vibration response investigation;

c) endurance at pre-determined frequencies.

3 Description of test apparatus

3.1 Test chamber conditions

3.1.1 Testing of non-heat-dissipating specimens

The test chamber shall comply with the requirements given in Test Ba or Bb as appropriate (see note to clause 2).

3.1.2 Testing of heat-dissipating specimens

The selection of the temperature monitoring point and the determination of the monitoring temperature can be made either in:

a) a chamber, normally provided with forced air circulation, capable of simulating the effects of "free air" conditions at high temperature and complying with the requirements given in clause 36 of IEC 60068-2-2 concerning Test Bd, or

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