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

This Australian Standard was prepared by Committee EL-026, Protective Enclosures and Environmental Testing for Electrical/Electronic Equipment. It was approved on behalf of the Council of Standards Australia on 17 April 2003 and published on 19 June 2003.

The following are represented on Committee EL-026:

Australian Chamber of Commerce and Industry

Australian Electrical and Electronic Manufacturer's Association

Electrical Compliance Testing Association

Electrical Regulatory Authorities Council

Electricity Supply Association of Australia

Testing Interests (Australia)

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 02605.

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

First published as AS 60068.2.51—2003.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 5279 9

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*.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

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

(c) A full point should be substituted for a comma when referring to a decimal marker.

(d) Any French text on figures should be ignored.

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).

CONTENTS

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.

STANDARDS AUSTRALIA

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

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